

ABSTRACT OF THE DISCLOSURE

A composite body produced by a reactive infiltration process that possesses high mechanical strength, high hardness and high stiffness has applications in such diverse industries as precision equipment and ballistic armor. Specifically, the composite material features a boron carbide filler or reinforcement phase, and a silicon carbide matrix produced by the reactive infiltration of an infiltrant having a silicon component with a porous mass having a carbonaceous component. Potential deleterious reaction of the boron carbide with silicon during infiltration is suppressed by alloying or dissolving boron into the silicon prior to contact of the silicon infiltrant with the boron carbide. In a preferred embodiment of the invention related specifically to armor, good ballistic performance can be advanced by loading the porous mass or preform to be infiltrated to a high degree with one or more hard fillers such as boron carbide, and by limiting the size of the largest particles making up the mass. The instant reaction-bonded silicon carbide (RBSC) composite bodies surpass previous RBSC's as armor materials, and in this capacity approach the ballistic performance of current carbide armor ceramics but with potentially lower cost manufacturing methods, e.g., infiltration techniques.

TOP SECRET - FRODO